Physical Review B - Condensed Matter and Materials Physics 2016 vol.94 N4

Structural order and melting of a quasi-one-dimensional electron system

Rees D., Beysengulov N., Teranishi Y., Tsao C., Yeh S., Chiu S., Lin Y., Tayurskii D., Lin J., Kono K.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© 2016 American Physical Society.We investigate the influence of confinement on the positional order of a quasi-1D electron system trapped on the surface of liquid helium. We find evidence that the melting of the Wigner solid (WS) depends on the confinement strength, as well as electron density and temperature. A reentrant solid-liquid-solid transition is observed for increasing electron density under constant electrostatic confinement. As the electron row number Ny changes, varying commensurability results in a modulation of the WS order, even when Ny is large (several tens). This is confirmed by Monte Carlo simulations.

http://dx.doi.org/10.1103/PhysRevB.94.045139